

# **AIR FORCE QUALIFICATION TRAINING PACKAGE (AFQTP)**



for  
STRUCTURAL  
(3E3X1)

**MODULE 29**  
**VEHICLE AND EQUIPMENT FACILITY DOORS**

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VEHICLE AND EQUIPMENT FACILITY DOORS

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Career Field Education and Training Plan (CFETP) references from 1 Apr 97 version.

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**AIR FORCE QUALIFICATION TRAINING PACKAGES**  
**for**  
**STRUCTURAL**  
**(3E3X1)**

**INTRODUCTION**

*Before starting this AFQTP*, refer to and read the “Trainee/Trainer Guide” located on the AFCESA Web site <http://www.afcesa.af.mil/>

*AFQTPs are mandatory and must be completed* to fulfill task knowledge requirements on core and diamond tasks for upgrade training. *It is important for the trainer and trainee to understand* that an AFQTP ***does not*** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

*AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.*

**MANDATORY minimum upgrade requirements:**

***Core task:***

AFQTP completion  
Hands-on certification

***Diamond task:***

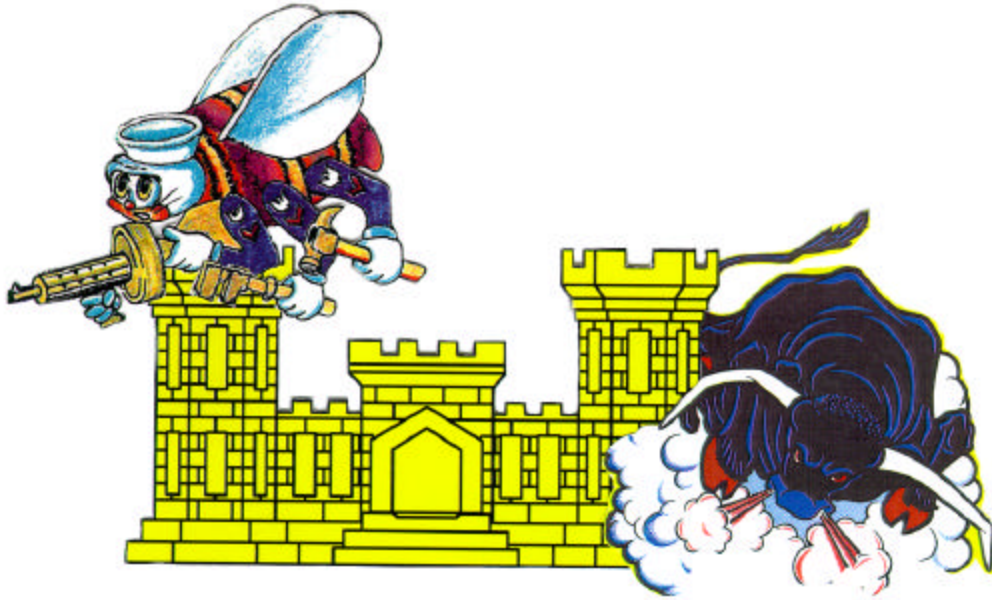
AFQTP completion  
CerTest completion (80% minimum to pass)

**Note:** *Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location.*

***Put this package to use.*** Subject matter experts under the direction and guidance of HQ AFCESA/CEOT revised this AFQTP. If you have any recommendations for improving this document, please contact the Structures Career Field Manager at the address below.

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## VEHICLE AND EQUIPMENT FACILITY DOORS

MODULE 29

AFQTP UNIT 1

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### INSPECT METAL DOORS (29.1.)

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**INSPECT METAL DOORS*****Task Training Guide***

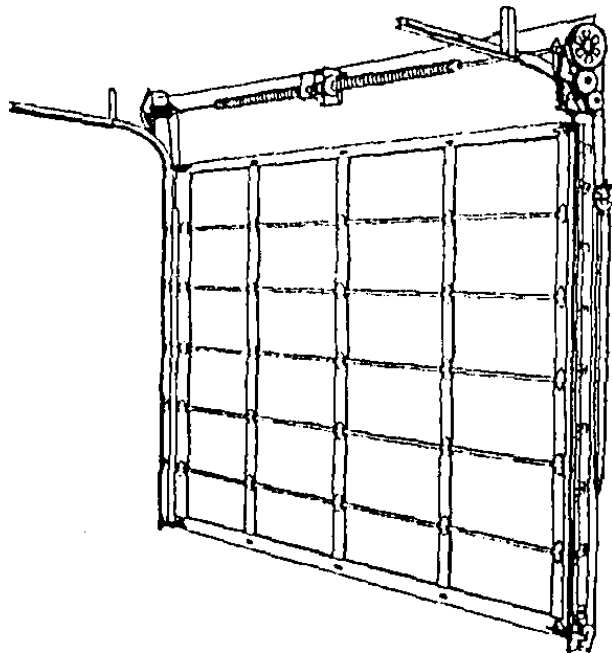
<b>STS Reference Number/Title:</b>	29.1. Inspect metal doors
<b>Training References:</b>	<ul style="list-style-type: none"> <li>• Manufacturer's instructions on Rollup and Overhead doors</li> <li>• 3E351 CDCs</li> </ul>
<b>Prerequisites:</b>	<ul style="list-style-type: none"> <li>• Possess as a minimum, a 3E3X1 AFSC.</li> </ul>
<b>Equipment/Tools Required:</b>	<ul style="list-style-type: none"> <li>• Overhead door, Roll up door</li> <li>• Paraffin wax, Silicon spray (if applicable)</li> </ul>
<b>Learning Objective:</b>	<ul style="list-style-type: none"> <li>• Trainee will perform inspection and maintenance on Overhead and Rollup doors successfully</li> </ul>
<b>Samples of Behavior:</b>	<ul style="list-style-type: none"> <li>• Trainee will perform inspection and maintenance on Overhead and Rollup doors successfully while adhering to all safety requirements.</li> </ul>
<b>Notes:</b>	
<ul style="list-style-type: none"> <li>• Any safety violation is an automatic failure</li> </ul>	

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## INSPECT METAL DOORS

**Background:** Webster's dictionary states that a door is a movable structure for closing off an entrance to a passage, room or building. In those many cases throughout the Air Force requiring access for very large items such as vehicles, forklifts or even aircraft, overhead or roll-up doors are often times used. There are virtually hundreds of different types, designs and manufacturers of overhead and roll-up doors used in the Air Force, but the theory of operation is pretty much the same. In this unit, we will discuss the differences and some inspection procedures common to most types.

**Overhead doors.** Overhead doors are made up of a number of large panels. These panels are hinged horizontally and ride on rollers mounted at each end of the panels in a track attached to the building. This track runs vertically to a certain point off the floor, and then turns horizontally, as shown in Figure 1. As the door is raised, it is displaced overhead, thus the name. The weight of the door is counter-balanced with the use of torsion springs attached to a steel shaft mounted to the wall above the door opening. At the end of this shaft are cable spools or drums that hold the cable that connects the shaft to the bottom of the door. When the correct amount of torsion is placed on the spring, this force is transferred to the cable creating a lift that neutralizes the excessive weight of the door. Turning the shaft that these springs are attached to will raise the door. The shaft of both the overhead and rollup doors may be turned either electrically or manually.



**Figure 1, Overhead door**

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*To inspect overhead doors, follow these steps:*

**Step 1: Conduct a visual inspection**

- Ensure the door is sitting in the opening squarely and evenly. If the door appears to be at a slight angle, tension has been lost from the low side, preventing the door from operating properly. This could be as easy as a broken cable or jumping off the spool or as complex as the spring losing its ability to hold tension.

**Step 2: Inspect hinges (See Figure 2)**

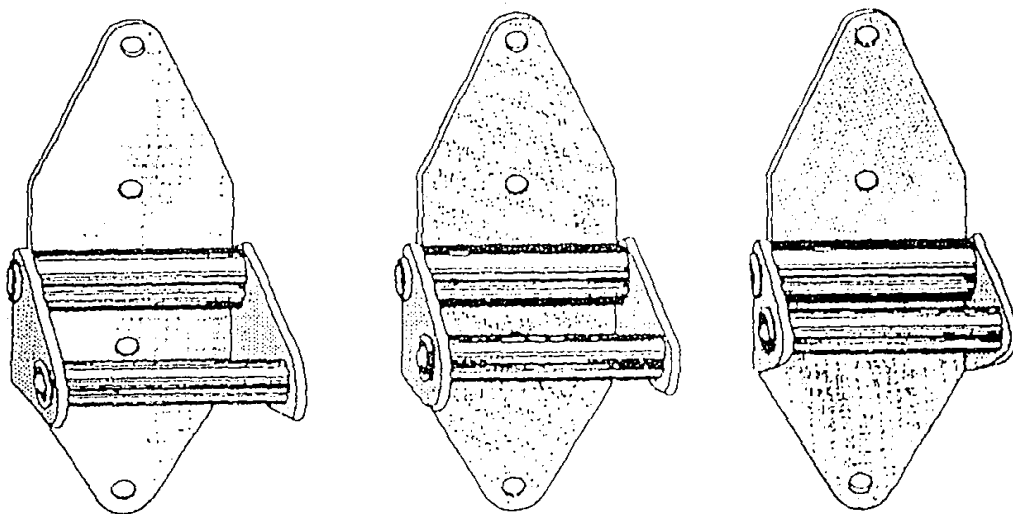
- Check hinges for loose or missing screws.
- Hinges must be able to pivot, if hinges are stiff or not pivoting properly.
- Ensure there isn't a build up of paint causing the hinges to freeze or lock up.
- If there is any damage to a hinge, you can remove it and try to repair the damage, but in most cases it's faster and more efficient to merely replace the damaged hinge.

**SAFETY:**

**CAUTION MUST BE OBSERVED IF REMOVING A HINGE CONTAINING A ROLLER, THE DOOR WILL TEND TO BOW TOWARDS YOU. REMOVING MORE THAN ONE HINGE FROM THE SAME ROW OF HINGES COULD ALLOW THE DOOR TO COLLAPSE.**

**NOTE:**

The hinges on the end of the panels closest to the track have a slot for the rollers. The rollers should be able to slide freely inside the hinge to allow for minor door shifting.



**Figure 2, Overhead Door Hinges**

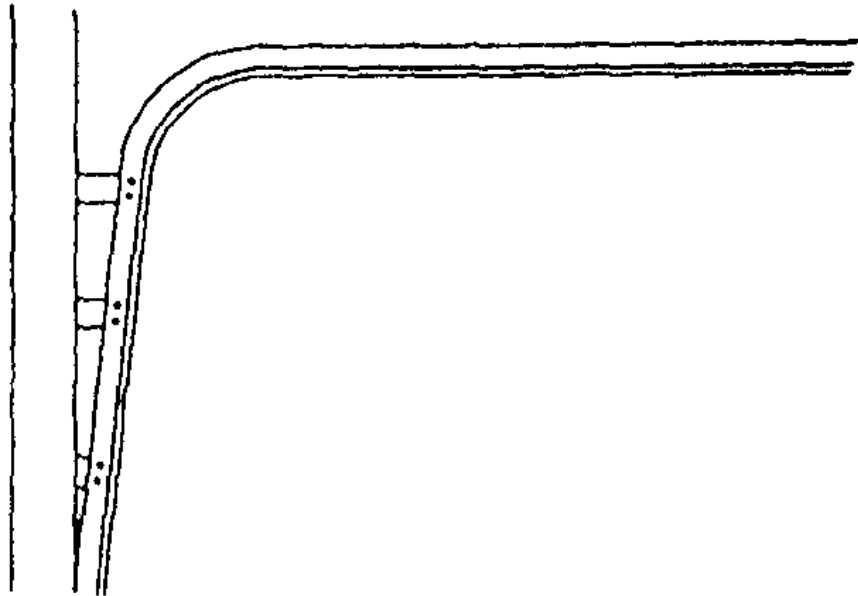
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**Step 3: Inspect the track and rollers. (See Figure 3)**

- The track is bolted or welded to the wall or jamb.
- If the bolts or welds are damaged or missing, it could put undo stress on the track allowing it to separate from the wall and could result in damage or injury to equipment or personnel. A closer inspection of both tracks should be made the entire length the rollers travel to ensure the rolled edge has not flattened out allowing the roller to come out of the track.
- The rollers need to be checked to ensure the ballbearings are in place and the shaft of the roller is not bent.

**NOTE:**

***Do not*** oil or grease the track and rollers. It acts as a magnet to dust and dirt causing the part to wear at a faster rate. Paraffin wax can be used in the track., and very small amounts of oil can be placed in the rollers to prevent rust and corrosion.



**Figure 3, Track Offset**

**Step 4: Check Cables.**

- The cable is the direct link of connecting the counterbalance system to the weight of the door. The cables are attached at the top to the cable spool or drum and at the bottom directly to the door as seen in figure 4.
- There are numerous reasons why one cable would be looser than the other one. Cable connections come undone, cable spool slip, or when the door was brought down it hit the floor so hard that it allowed the spring to unwind a little more on one side than the other, just to mention a few.

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- Also check for any fraying of the cables. If a cable should snap while in the up position, it could cause the door to jamb open, preventing the building from being secured or it could cause the other side to come undone and the door to drop to the floor causing damage to the bottom panels. If it should snap while being raised, it could also cause injury to the operator.

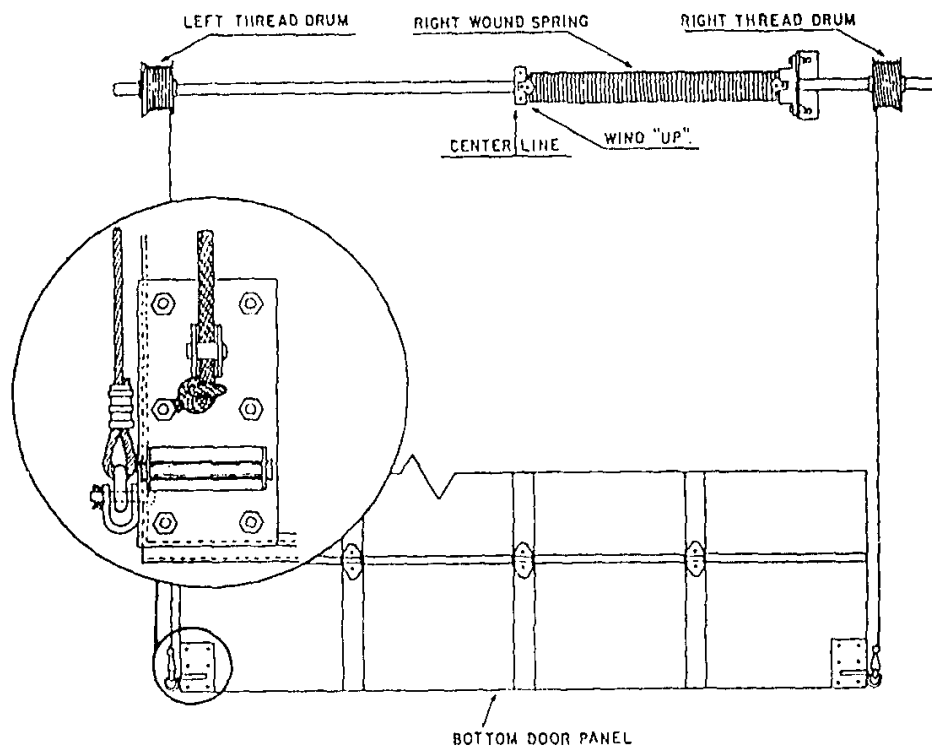
**Step 5: Inspect the Cable Spool/drums.**

- The cable spool, or cable drum as it is sometimes referred to, is used to take up the cable as the door is raised.
- The size of the door determines the size of the drum. The taller the door, the more cable required. The more cable required, the larger the drum needs to be to take up the cable.
- The cable spool/drum is attached to the door shaft by two bolts threaded through the spool/drum and tightened to the shaft as to grip it. Shafts of larger doors normally have a keyway as well to help prevent the drum from slipping on the shaft.
- A keyway is a narrow slot machined into the ends of the shaft that correspond to a slot in the drum. A key, or a piece of hardened square stock, is inserted into the keyway and the drum is slipped over the key, thus locking the shaft and drum together.
- Things to look for when inspecting this cable spool/drum is that the key is properly inserted and not about to slip out; are both the bolts securely attached in the drum and is the drum cracked or chipped.
- The cable is attached to the spool/drum simply by inserting the cable into a slot on the outside lip of the spool/drum.
- If the spool/drum is cracked or chipped, it could allow the cable to slip out, releasing the tension on that spring.

**Step 6: Check the springs. (See Figure 4)**

- Lastly, check the springs at the top of the door. The springs are the key to the whole counterbalance system. The number of springs on each door depends on the door size, small doors could have one spring and larger doors could have as many as six, the most common number however, is two. These springs need to be checked for tension, if the door is hard to lift there is not enough tension and if the tension is too great, the door may stay in the open position. This would be an indication that the springs need to be re-adjusted. If a spring is knotted and twisted, chances are the spring has sprung and is unable to hold the proper tension. In this case, the spring will require replacement.

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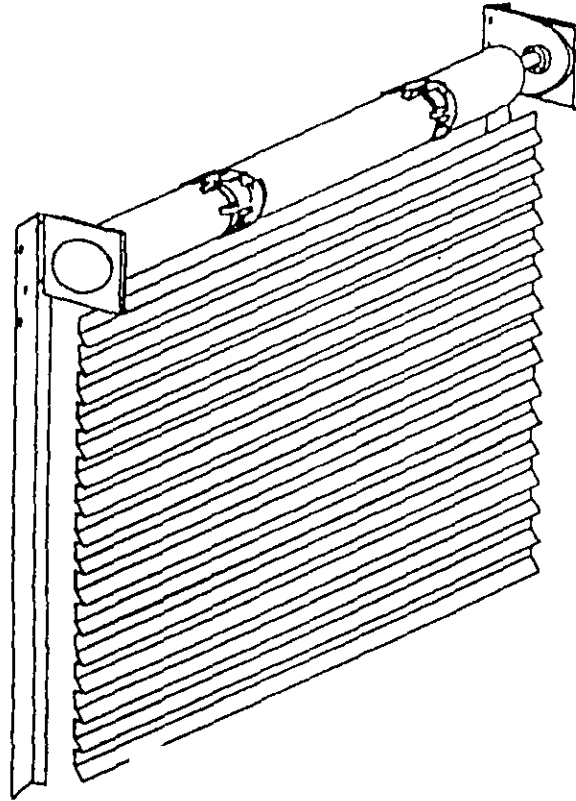
**Figure 4, Overhead Door Counterbalance (Featuring Springs)**

**SAFETY:**

**THERE IS A GREAT AMOUNT OF TENSION ON THE SPRINGS AND BEFORE LOOSENING ANY BOLTS OR MOVING THE SPRINGS MAKE CERTAIN ALL SAFETY PRECAUTIONS ARE TAKEN.**

**Roll up doors.** Roll up doors have a curtain of metal slats that roll up around a tube or shaft as it is raised (See Figure 5). This tube contains torsion springs much like those used for the overhead door, which counterbalance the weight of the door curtain. The metal slats making up this curtain come in various shapes depending on the manufacturer, but all are relatively small to allow the curtain to roll into a small cylinder when raised (See Figure 8). The curtain is attached to the shaft by several metal collars that bolt to the curtain, then wrap around the shaft and bolt to itself. Both ends of the slats are inserted in tracks mounted to the building. Normally there is a chain-operated gear reduction assembly used to turn the shaft that raises the door. There are many variations of this assembly, direct gear, power-driven and gear reduction to name a few (See Figure 6).

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**Figure 5, Roll up Door**

*To inspect roll up doors, follow these steps:*

**Step 1: Conduct a visual inspection.**

- Ensure the door is sitting in the opening squarely and evenly. If the door appears to be at a slight angle, it could be as simple as one or more of the collars attaching the curtain to the shaft has slipped, or as complex as the spring within the tube has broken.

**Step 2: Check gear and sprocket alignment.**

- Use a straight edge and lay it across the face of both gears and sprockets to check for the alignment (See Figures 6 and 7). The straight edge must touch the face fully on both gears. If they do not touch then a setscrew must be loosened and the gear should be re-aligned. Make certain the setscrew is re-tightened securely after the gear is properly aligned.

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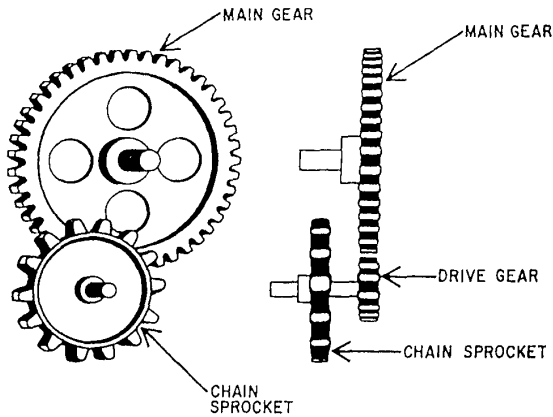


Figure 6, Typical Gear Driven Mechanism

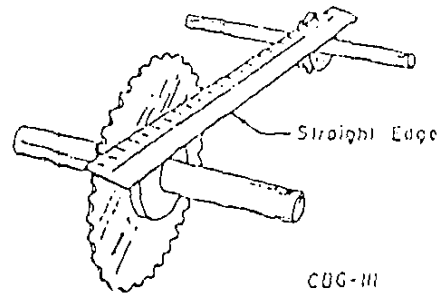


Figure 7, Sprocket Alignment

**Step 3: Inspect all door/mechanism hardware.**

- Ensure all nuts, bolts and setscrews are in place and securely fastened. Lubrication should be done with a paraffin wax or a silicon spray. This type of lubrication prevents attracting dust and dirt.

**Step 4: Perform an operations check.**

- Once everything checks out all right, perform an operations check. Actually operate the door up and down two or three times, watching its operation. Observe how smoothly it rolls up and down.
- If the motion is jerky, it could be that the track is in need of lubrication (refer to the lubrication suggested in step 3). If the door hangs up or binds on one side when coming down, there could be a damaged slat. Pay close attention to this operation, if there is anything wrong with the door, it will be evident through this step.

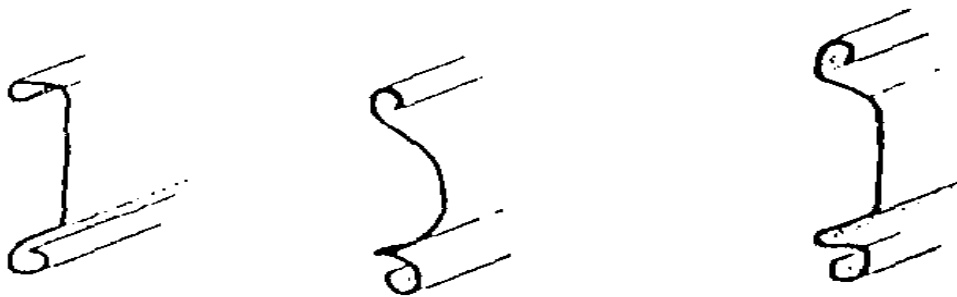


Figure 8, Door Slat Shapes for Typical Rollup Doors Only

**NOTE:**

It is advisable to always refer to the manufacturers manual for proper inspections and repairs.

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## Review Questions for Inspect Metal Doors

Question	Answer
1. The excessive weight of overhead and roll up doors is counter-balanced by the use of torsion springs.	a. True b. False
2. Overhead doors are hinged on the panels vertically.	a. True b. False
3. If there is any damage to a hinge, _____.	a. lubricate them b. replace all the hinges c. replace the damaged hinge only d. perform necessary repairs to the panel
4. The track is bolted or welded to the _____ or jamb.	a. wall b. floor c. header d. panels
5. A closer inspection of the _____ should be made to ensure there aren't any flattened out areas, allowing the roller to come out of the track.	a. track b. hinges c. rollers d. ballbearings
6. _____ wax can be used in the track, and very small amounts of oil can be placed in the rollers to prevent rust and corrosion.	a. Car b. Floor c. Canola d. Paraffin
7. If an overhead door is hard to lift, there is not enough tension on the springs.	a. True b. False
8. A straight edge should be used when checking curtain alignment on roll up doors.	a. True b. False
9. When performing an operations check on a roll up door, if it hangs up on one side, chances are that _____	a. the cable has slipped b. a door slat is damaged c. the track has been greased d. the door track has pulled loose
10. It is always advisable to refer to the manufacturers manual for proper inspections and repairs on roll up doors.	a. True b. False

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**INSPECT METAL DOORS**

<b>Performance Checklist</b>		
<b>Step</b>	<b>Yes</b>	<b>No</b>
1. Can trainee perform inspection on Overhead doors successfully?		
2. Can trainee perform inspection on Roll up doors successfully?		

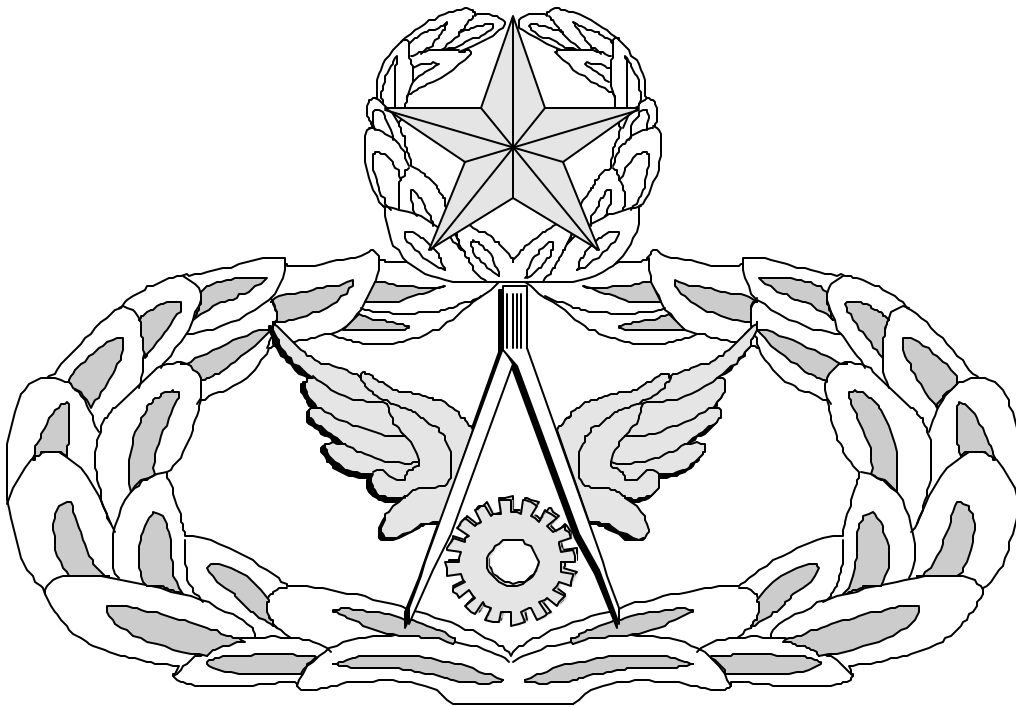
**FEEDBACK:** Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

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# Air Force Civil Engineer

## QUALIFICATION TRAINING PACKAGE (QTP)

### REVIEW ANSWER KEY



for  
STRUCTURAL

(3E3X1)

MODULE 29

VEHICLE AND EQUIPMENT FACILITY DOORS

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**Key-1**

## INSPECT METAL DOORS

(3E3X1-29.1.)

Question	Answer
1. The excessive weight of overhead and roll up doors is counter-balanced by the use of torsion springs.	a. True
2. Overhead doors are hinged on the panels vertically.	b. False
3. If there is any damage to a hinge, _____	b. replace the damaged hinge only
4. The track is bolted or welded to the _____ or jamb.	a. wall
5. A closer inspection of the _____ should be made to ensure there aren't any flattened out areas, allowing the roller to come out of the track.	a. track
6. _____ wax can be used in the track, and very small amounts of oil can be placed in the rollers to prevent rust and corrosion.	d. Paraffin
7. If an overhead door is hard to lift, there is not enough tension on the springs.	a. True
8. A straight edge should be used when checking curtain alignment on roll up doors.	b. False
9. When performing an operations check on a rollup door, if the curtain hangs up on one side, chances are that _____	b. a door slat is damaged
10. It is always advisable to refer to the manufacturers manual for proper inspections and repairs on roll up doors.	a. True

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